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基于竞争终端个数区间的IEEE 802.11性能优化

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Abstract
The number of competing stations has great influence on the performance of IEEE 802.11 MAC protocol based on the distributed coordination function (DCF), which utilizes carrier sense multiple access with collision avoidance (CSMA/CA). In this research, it is found that the system performance approaches the optimal values with the same protocol parameters, when the number of competing stations dynamically changes within a certain range. Therefore, an adaptive optimization mechanism, DOOR (dynamic optimization on range), is proposed for the IEEE 802.11 DCF, which is based on the condition detection and range of competing station number. Moreover, the principle and method for partitioning the range of competing station number are also introduced. Later on, the detailed system model and performance evaluation for the new mechanism are given. The elaborate numerical results show that the mechanism could achieve much higher throughput and shorter delay than the standard IEEE 802.11 DCF in almost all the different competing stations numbers.

Li HW, Wu JP, Ma H, Zhang PY, Luo SX. Performance optimization for IEEE 802.11 based on the range of contention station number. *Journal of Software*, 2004,15(12):1850~1859.
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摘要
IEEE 802.11的MAC协议采用基于CSMA/CA的DCF机制,研究发现,上述协议的性能随无线局域网中竞争终端个数的增加而迅速恶化.当竞争终端个数在一定范围内变化时,使用相同的优化协议参数,系统的性能都能接近最优.因此,设计了一个基于状态检测与竞争终端个数区间的自适应性能优化机制,DOOR(dynamic optimization on range).根据相关性能模型的分析,先将竞争终端的个数分为若干区间,并分别计算出各区间的优化协议参数.当系统检测到竞争终端个数发生变化时,根据其所处的区间,对相关的参数进行动态调整,从而有效地改善了协议的整体性能.同时还给出了相关理论模型和计算的详细说明,并尝试给出了划分区间的基本原则与方法.最后,实验仿真结果验证了新的方法能够根据竞争终端个数的变化对系统性能进行整体优化,在吞吐量和延迟等方面明显优于标准的IEEE 802.11协议.

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